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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/077,569	02/15/2002	Chun-Hua Chen	227	3238

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Harry M. Levy, Esq.
Emrich & Dithmar
Suite 3000
300 South Wacker Drive
Chicago, IL 60606

EXAMINER	
WILLS, MONIQUE M	
ART UNIT	PAPER NUMBER
1746	

DATE MAILED: 03/31/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/077,569	CHEN ET AL.	
	Examiner	Art Unit	
	Wills M Monique	1746	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *15 February 2002*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-28* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-28* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *15 February 2002* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Objections

Claim 1 is objected to because of the following informalities: there needs to be a comma between "vinyl ethylene carbonate" and "vinyl quinone". Appropriate correction is required.

Claim 24 is objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. Claim 1 specifically states that the additive is vinyl ethylene carbonate vinyl quinone. Claim 24 is drawn to vinyl quinone which broadens the scope of the claims. Appropriate correction is required.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 1-32 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art

to which it pertains, or with which it is most nearly connected, to make and/or use the invention. More specifically, claim 1 states the use of gas suppressing additives however, it is unclear from the specification what these materials are.

Claim 12 is rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for a blend of flame retardant and anode passivation additives, does not reasonably provide enablement for monofluoroethylene. The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make the invention commensurate in scope with these claims. More specifically, the specification does not describe or refer to monofluoroethylene.

Claim 25 is rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for a blend of flame retardant and anode passivation additives, does not reasonably provide enablement for derivatives of vinyl crontonate. The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make the invention commensurate in scope with these claims. More specifically, the specification does not describe or refer to derivatives of vinyl crontonate.

Claim 27 is rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for a blend of flame retardant and anode passivation additives, does not reasonably provide enablement for vinylimidazole. The specification does not enable any person skilled in the art to which it pertains, or

with which it is most nearly connected, to make the invention commensurate in scope with these claims. More specifically, the specification does not describe or refer to vinylimidazole.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 2-26 & 28 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Each claim further defines "the additive". It is unclear as to which additive Applicant is referring to. For example, in claim 3, "the additive is a mixture of monobutyl-diphenyl phosphate, dibutyl-monophenyl phosphate and vinyl ethylene carbonate". But it is unclear as to whether these additives are the flame retardant, additives, anode passivation additives, ~~or~~ gas suppression additives, or combination thereof.

Claim 27 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The claim requires the lithium battery wherein said compound is vinylimidazole. It is unclear as to which compound the claim is referring to. Is the compound a lithium

electrode compound, flame retardant compound, anode passivation compound or gas passivation compound? Appropriate correction is required.

Claim 29 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The claim requires the compound added in a proportion of 0.001 to 20% by weight of the electrolyte. It is unclear as to which compound the claim is referring to. Is the compound a lithium electrode compound, flame retardant compound, anode passivation compound or gas passivation compound? Appropriate correction is required.

Allowable Subject Matter

Claims 9,10, 24 & 25 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

With respect to claim 9, the prior art does not teach or suggest, the non-aqueous rechargeable lithium battery of claim 1, wherein the electrolyte additive is a mixture of tripropyl phosphate, triphenyl phosphate and ethyl-2-furoate.

With respect to claim 10, the prior art does not teach or suggest, the non-aqueous rechargeable lithium battery of claim 1, wherein the electrolyte additive is a mixture of monoamyl-diphenyl phosphate and methyl silyl carbonate.

With respect to claim 24, the prior art does not teach or suggest, the non-aqueous rechargeable lithium battery of claim 1, wherein the electrolyte additive is vinyl quinone. The claim would be allowable once the scope of the claim narrows claim 1 (see objection above).

With respect to claim 25, the prior art does not teach or suggest, the non-aqueous rechargeable lithium battery of claim 1, wherein the electrolyte additive is a mixture of vinyl crontonate and triphenyl phosphate. The claim would be allowable once the 112 first paragraph rejection is overcome.

Claim Interpretation

The compound in claim 29 is considered to be the flame retardant additive. Therefore, claim 29 is interpreted as necessitating the flame retardant added in a proportion of 0.001% to 20% by weight of the electrolyte.

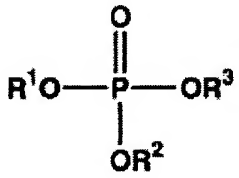
Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1,2, 22, 29 ,31 & 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Olsen et al., U.S. Patent 5,455,127, in view of Kotado et al. JP 2001-006729.

Olsen is directed to a solid electrolyte containing a polymeric matrix, salt, solvent, viscosifying agent and flame retardant (abstract). With respect to claim 1, the lithium secondary battery comprises: a lithium insertion compound cathode (col. 7, lines 8-15); a negative electrode of lithium or lithium alloy (col. 7, lines 1-6); a lithium salt dissolved in an electrolyte solvent (col. 6, lines 1-10); (col. 6, lines 10-20); and a flame retardant comprising a phenyl alkyl phosphate of the formula:



wherein each of R^1, R^2 and R^3 is one of an organic aliphatic compound, for example, CH_3, C_2H_5, C_3H_7, $C_4H_9C_5H_{11}$, and the like, and an aromatic compound, for example, C_6H_5, and the like. Suitable flame retardant compounds of the present invention include trimethyl phosphate, triethyl phosphate, triphenyl phosphate, 2-ethylhexyl diphenyl

phosphate, trimethylene phosphate, and the like. See col. 6, lines 50-68. With respect to claim 2, 4,4-diethyl-1,3-dioxolan-2-one may be added to the electrolyte (col. 6, lines 10-20). With respect to claims 22 & 29, the electrolyte may contain 10 to 40 percent by weight of the flame retardant (col. 8, lines 38-42). In re claim 31, the lithium salt is selected from lithium hexafluorphosphate, lithium tetrafluoroborate, lithium hexafluoroarsente and lithium perchlorate (col. 6, lines 1-5). Regarding claim 32, the cathode material includes lithium manganese oxide (col. 7, lines 13-16).

Olsen is silent to an anode passivation additive such as vinyl ethylene carbonate.

Kotado teaches that it is conventional to employ vinyl ethylene carbonate electrolyte solvents to minimize decomposition of the electrolyte, provide high capacity and maintain excellent storage and cycle characteristics at high temperatures (abstract).

The invention as a whole would have been obvious to one having ordinary skill in the art at the time the instant invention was made, because even though Olsen does not teach vinyl ethylene carbonate additives, Kotado teaches that vinyl ethylene carbonate minimizes decomposition of the electrolyte, provides high capacity and maintains excellent storage and cycle characteristics at high temperatures.

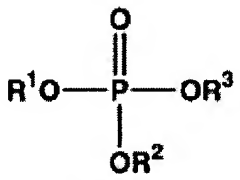
Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1, 3-8, 11, 15, 23, 28 30, 31 & 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gan et al., U.S. Patent 6,068,950 in view of Kotado et al. JP 2001-006729.

Gan is directed to an alkali metal electrochemical cell comprising at least one phosphate additive (abstract). With respect to claim 1, the electrochemical cell comprises: a lithium insertion compound cathode (col. 5, lines 13-18); a negative electrode of lithium or lithium alloys (col. 4, lines 1-6); a lithium salt dissolved in an electrolyte solvent (col. 6, lines 20-40); and a flame retardant comprising a phenyl alkyl phosphate of the formula:



wherein each of R^1, R^2 and R^3 are not hydrogen, at least one of them is $CR^1R^2R^3$ where at least R is an aromatic e substituent (col. 6, lines 45-50). With respect to claim 30,

the electrolyte solvent includes a mixture of propylene carbonate and dimethyl carbonate (col. 6, lines 20-30). In re claim 31, the lithium salt is selected from lithium hexafluorphosphate, lithium tetrafluoroborate, lithium hexafluoroarsente and lithium perchlorate (col. 6, lines 35-40). Regarding claim 32, the cathode material includes lithium nickel oxide (col. 5, lines 13-16). Various mixtures of the organo-phosphate are used as additives in the electrolyte (col. 6, lines 60-68).

Gan is silent to an anode passivation additive such as vinyl ethylene carbonate (claim 1) and pairing specific phosphate compounds (3-8,11,15,23 & 28).

Kotado teaches that it is conventional to employ vinyl ethylene carbonate electrolyte solvents to minimize decomposition of the electrolyte, provide high capacity and maintain excellent storage and cycle characteristics at high temperatures (abstract).

The invention as a whole would have been obvious to one having ordinary skill in the art at the time the instant invention was made, because even though Gan does not teach vinyl ethylene carbonate additives, Kotado teaches that vinyl ethylene carbonate minimizes decomposition of the electrolyte, provides high capacity and maintains excellent storage and cycle characteristics at high temperatures.

With respect to the claims 3-8,11,15,23 & 28, pairing specific phenyl phosphate compounds, the skilled artisan would be motivated to pick and choose a combination of various compounds, because the general formula of the alkyl phosphate embraces the combinations necessitated by the claims.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 14 & 16-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gan et al., U.S. Patent 6,068,950, in view of Kotado et al. JP 2001-006729 as applied to claim 1 above, in view of Sekino et al., U.S. Pub. 2002/0164531.

Gan in view of Kotado teach an organic phosphate additive for nonaqueous electrolytes as described hereinabove. Specifically, Gan teaches the use of an ethyl methyl carbonate electrolyte solvent (col. 6, lines 20-25).

Gan is silent to vinyl ethylene sulfite (claim 14) and a monophenyl carbonate, such as monphenyl ethylene carbonate (claims 16-17).

Sekino teaches the equivalence ethyl methyl carbonate, vinyl ethylene sulfite and monophenyl ethylene carbonate (par. 131-133).

The subject matter as a whole would have been obvious to one having ordinary skill in the art at the time the instant invention was made because even though Gan does not teach vinyl ethylene sulfite or monophenyl ethylene carbonate electrolyte solvents, Sekino teaches that ethyl methyl carbonate, monophenyl carbonate and vinyl

ethylene sulfite are equivalent electrolyte solvents for lithium cells.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 12,18,19 20 & 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Olsen et al., U.S. Patent 5,455,127, in view of Kotado et al. JP 2001-006729. as applied to claim 1 above, in view of McMillan et al., U.S. Patent 6,506,524.

Olsen in view of Kotado teaches an organic phosphate additive for nonaqueous electrolytes as described hereinabove. Specifically, with respect to claims 12,18,18,20 & 21, Olsen teaches an organic phosphate additive as a flame retardant in electrolytes (col. 6, lines 60-65). The flame retardant embraces triphenyl phosphate (claims 12,18,19 & 21), monobutyl-diphenyl phosphate (claim 19) and tripropyl phosphate (claim 20). See column 6, lines 50-68. The electrolyte may further comprise propylene carbonate (col. 11, lines 1-10).

Olsen is silent to an electrolyte additive comprising: monofluoroethylene carbonate (claim 12); 1,2-difluoroethylene carbonate (claims 18-19); and

monofluorovinyl ethylene carbonate (claims 20-21). The reference is also silent to fluoroethylene carbonate and triphenyl phosphate being present up to about 3 wt% of the electrolyte (claim 12).

McMillan teaches that it is convention to employ fluorinated ethylene carbonate (col. 11, lines 24-25) solvents in conventional electrolytes to increase stabilization of the passivation film , reduce consumption of the electrolyte and increase cell capacity (abstract).

The invention as a whole would have been obvious to one having ordinary skill in the art at the time the instant invention was made because even though Olsen does not teach fluorinated ethylene carbonate compounds in the electrolyte, McMillan teaches that fluorinated ethylene carbonate increases stabilization of the passivation film, reduced consumption of the electrolyte and increases cell capacity.

With respect to the fluoroethylene carbonate and triphenyl phosphate being present up to about 3 wt% of the electrolyte, it would have been obvious to one of ordinary skill in the art at the time the invention was made to employ fluoroethylene carbonate and triphenyl phosphate in an amount of 3wt%, since it has been held that discovering optimum value of a result effective variable involves only routine skill in the art. In re Boesch, 617 F. 2d 272, 205 USPQ 215 (CCPA 1980). The skilled artisan recognizes the addition of fluoroethylene carbonate directly effects stability of the passivation film. The skilled artisan recognizes the addition of triphenyl phosphate directly effects the flame retardant ability of the electrolyte.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claim 26 is rejected under 35 U.S.C. 103(a) as being unpatentable over Gan et al. U.S. Patent 6,068,950, in view of Kotado et al. JP 2001-006729. as applied to claim 1 above, in view of Tobishima JP 358214281.

Gan in view of Kotado teach an organic phosphate additive for nonaqueous electrolytes as described hereinabove. Specifically, Gan teaches tripropyl phosphate flame retardant additive in electrolytes as described hereinabove.

Gan is silent to a 9-fluorenone electrolyte additive.

Tobishima teaches that additives such as 2,4,7-trinitro-9-fluorenone in electrolytes increases charge/discharge performance in lithium batteries (abstract).

Gan and Tobishima are analogous art because they are from the same field of endeavor, namely, fabricating lithium electrochemical cells.

Therefore, the invention as a whole would have been obvious to one having ordinary skill in the art at the time the instant invention was made, because even though Gan does not teach a 9-fluorenone electrolyte additive, Tobishima teaches that

additives such as 2,4,7-trinitro-9-fluorenone increase charge/discharge performance in lithium batteries.

Conclusions

Any inquiry concerning this communication or earlier communications from the Examiner should be directed to Monique Wills whose telephone number is (571) 272-1309. The Examiner can normally be reached on Monday-Friday from 8:30am to 5:00 pm.

If attempts to reach Examiner by telephone are unsuccessful, the Examiner's supervisor, Randy Gulakowski, may be reached at 571-272-1302. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Mw

03/16/04

BRUCE F. BELL
PRIMARY EXAMINER
GROUP 1746